UNIVERSITY OF MINNESOTA EXTENSION

Grape Breeding and Enology

Sensory Analysis of Itasca Wines

PRELIMINARY FINDINGS OF INDUSTRY SENSORY EVALUATION OF ITASCA WINEMAKING PRACTICES

Presented by Matthew Clark, Assistant Professor and Andrew Horton, Enology Specialist

Sensory Analysis of Itasca Wines

PRELIMINARY FINDINGS OF INDUSTRY SENSORY EVALUATION OF ITASCA WINEMAKING PRACTICES

September 11, 2019

Presented by Matthew Clark and Andrew Horton

Report Reviewers: A. Klodd
Partners/Sponsors: Midwest Grape and Wine Industry Institute; Minnesota Grape Growers Association; Enartis by Vinquiry; Minnesota Farm Winery Association; Southern Minnesota Wine Grower Alliance; Scott Laboratories; Laffort USA

Introduction

'Itasca' is a new wine grape variety developed at the University of Minnesota and released in 2017. This grape variety demonstrates vineyard sustainability traits like cold hardiness, powdery mildew resistance, and low incidence of foliar phylloxera. Furthermore, the juice of the wine is about 30% lower in total acidity than its parent 'Frontenac Gris', making it suitable for dry wine production or for use in blending. The novelty of this variety means that few winemakers have had an opportunity to trial different winemaking practices. In 2017 and 2018 we made experimental 'Itasca' wines in order to provide some initial insight to winemakers who may be making 'Itasca' wines for the first time. We conducted 2 different experiments, and then conducted sensory analysis of the wines during the Cold Climate Conference in 2018 and 2019. Here we describe the preliminary results of this research.

Experiment 1: Yeast selection and malolactic fermentation affect Itasca wine sensory traits

Three yeasts were selected due to their ability to create specific types of aromatic and flavor compounds from precursors in 'Itasca' grapes, and one yeast was a neutral, control yeast (Table 1): DV10 (neutral/control), Alchemy 2 (thiols), V1116 (aka K1) (esters), and Laffort VL1 (terpenes). Itasca grapes were picked on September 28, 2017 and had initial pH of 3.08, total titratable acidity of 9.3 g/L, and soluble solid content of 23.5 °Brix. Fruit was destemmed, and pressed per our standard white wine protocols and divided into 4 lots, one for each yeast treatment. At the completion of fermentation (12 days), the fermented wines were divided into 2 lots each for the secondary, malolactic fermentation (MLF) treatment. Half of the wines were inoculated with VP-41 malolactic bacteria, and incubated for approximately 20 days until MLF was completed, as indicated by chromatography tests. The wines were cold stabilized, then bottled until sensory evaluation.

Table 1. Wine treatments including the yeast selection and malolactic fermentation details.

Treatment	Objective	Manufacturer
DV-10	Control	Lallemand
V1116 (K1)	Esters	Lalvin
Alchemy 2	Thiols	AWRI
VL-1	Terpenes	Laffort
VP-41 (bacteria)	MLF	Lalvin

At the 2018 Minnesota Cold Climate Conference in Bloomington, MN, seventy-seven participants evaluated the 8 wines. The panelists were attendees of the conference who bought a ticket to participate in the sensory evaluation. The panelists consisted of grape and wine industry professionals over the age of 21. The wines were randomized, poured blind, but placed in the same order for all participants.

Participants were instructed on how to conduct the sensory analysis and used a labeled magnitude line scale to indicate their perception of sour, sweet, aroma, body for each wine from “No Sensation” to “Strongest Imaginable Sensation of Any Kind”. They also indicated on the scale from “Greatest Possible Dislike” to “Greatest Possible Like”. Participants marked onto their score sheet their perceptions. These were later measured (in mm) and used for the quantitative analysis for each wine.

Data were analyzed using the R statistical software platform. Data were transformed to account for the skewness of the data. Data were then subjected to analysis of variance (ANOVA) to determine if there were differences among the wines individually, by yeast, or among the MLF treatments for each sensory attribute.

Experiment 1 Results and Discussion

Yeast selection and MLF treatments did result in wines with different sensory attributes for sourness, aroma, and overall liking. This experiment was not set-up to evaluate differences in the flavor or aroma profiles by compound or class of compounds. We were only able to make inferences on the abundance of the perception of the trait and not delineate which terpenes, esters, or thiols were present. In a separate evaluation, the wines made with MLF were described as having butter, butterscotch, and caramel flavors a typical outcome of MLF.

Yeast selection and MLF did not impact the sensory perception for sweetness (Fig. 1). All of these wines were made to dryness, so any perception of sweetness was most likely related to the fruity, aromatic qualities of the wine. There was no significant difference among the wines for sweetness according to our ANOVA.

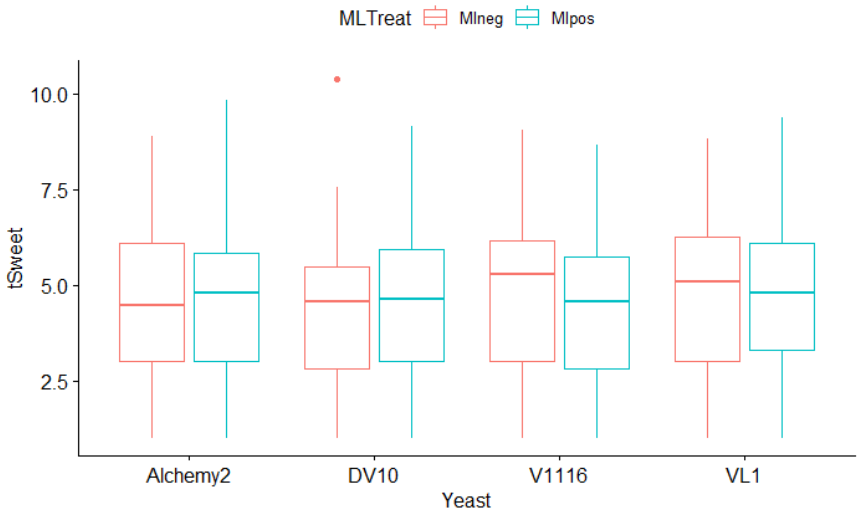

Fig 1. Boxplots for sensory perception of sweetness showing the range (whiskers) and median values (horizontal line) of each wine evaluated by yeast treatment and malolactic fermentation treatment. Lower values indicate less perception of sweetness. No significant differences were observed among these wines, as all wines were fermented to dryness.

There was a significant difference for sourness perceived by the panelists. However, this was due to yeast selection as the MLF treatment did not produce a statistically significant difference for sourness. For many of the wines, the MLF treatment did produce a less sour wine trending towards being statistically significant ($p = 0.09$), but there was an opposite effect in V1116. The type of yeast used produced a significant effect and wines produced with DV10 were perceived as the most sour and VL1 as the least (Table 2). When wines were compared individually, there were small, but significant differences among some of the wines (Fig. 2), DV10 without MLF had the highest mean sourness rating. There were minor differences among the final pH and total titratable acidity (Table 3).

Table 2. Means (transformed) for the sensory panelist perception of sour for the different yeasts treatments, independent of malolactic fermentation treatment. Letters show significant differences between yeast treatments.[1]

Yeast	Mean	sd	HSD
DV10	6.42	1.84	a
Alchemy2	5.97	1.69	ab
V1116 (K1)	5.97	1.83	ab
VL1	5.82	1.73	b

Table 3. Final wine chemistry by treatment: pH, total titratable acidity (TA), and alcohol by yeast and malolactic fermentation treatment (MLF +).

	pH		TA (g/l)		Alcohol (%)	
	Control	MLF+	Control	MLF+	Control	MLF+
DV-10	3.18	3.26	7.29	7.18	13.7	13.6
V1116 (K1)	3.18	3.27	6.74	6.96	13.7	13.8
Alchemy 2	3.20	3.31	6.85	6.05	13.7	13.7
VL-1	3.18	3.34	7.16	6.22	13.7	13.9

[1] **A note to understanding the tables and figures**. In order to show the differences among the means, Tukey's HSD test was conducted. This is a conservative approach. Letters are assigned to group the wine or the treatment as is the case in Table 2. For example, in Fig. 1, the letters above the boxes are used to group wines. Any wine with an "a" is not different from any other wine having an "a" or "ab". The wine Alchemy2-Mlpos, has a "b" and this is no different from VL1-Mlpos, but is significantly different form DV10-Mlneg "a", but not DV10-Mlpos "ab".

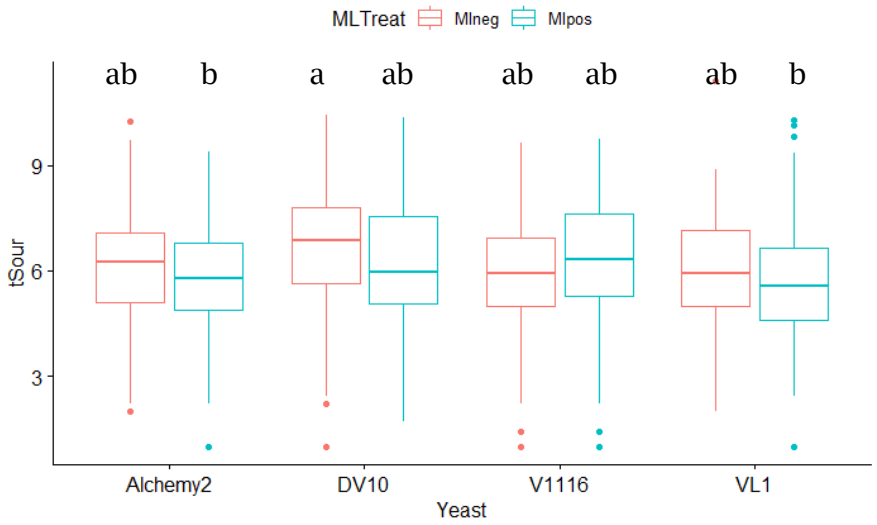

Fig 2. Boxplots for sensory perception of sourness showing the range and median values. Lower values indicate less sour perception. Letters that are different indicate significant difference among wines.

Yeast selection alone did not impact the panelists' perception of wine aromatics. Different aromatic compounds may have been produced among the wines, but our experiment did not test this. The MLF treatment was highly significant ($p > .0001$). The no MLF treatment had a higher perception of aromatics in the wine. When comparing each wine, V1116 (K1) without MLF was the highest for aromatics, and interestingly, had the lowest aromatics with the MLF treatment.

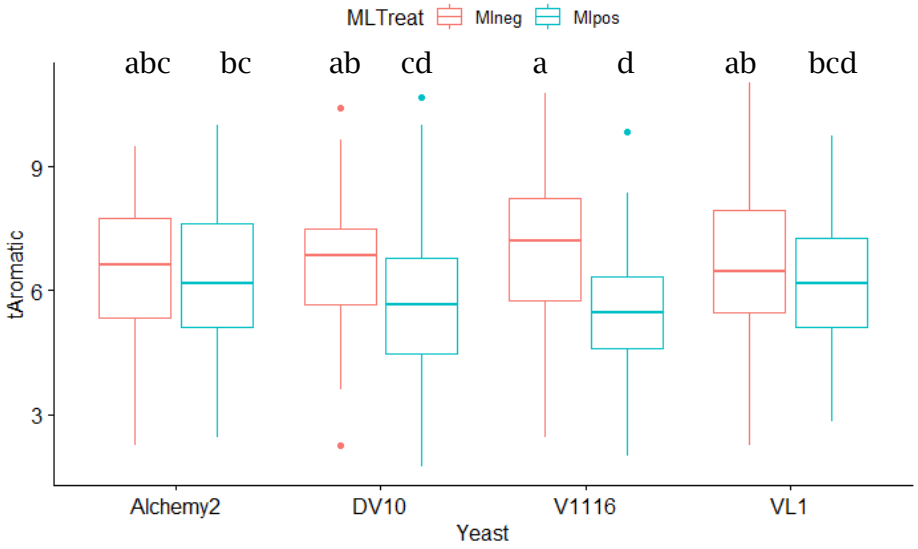

Fig 3. Boxplots for sensory perception of aroma showing the range and median values. Lower values indicate less perception of aromatic compounds. Letters that are different indicate significant difference among wines.

The perception of a wine's body was not impacted by the yeast or MLF treatment (Fig. 4). This was an expected outcome, as we did not anticipate any changes in this sensory attribute.

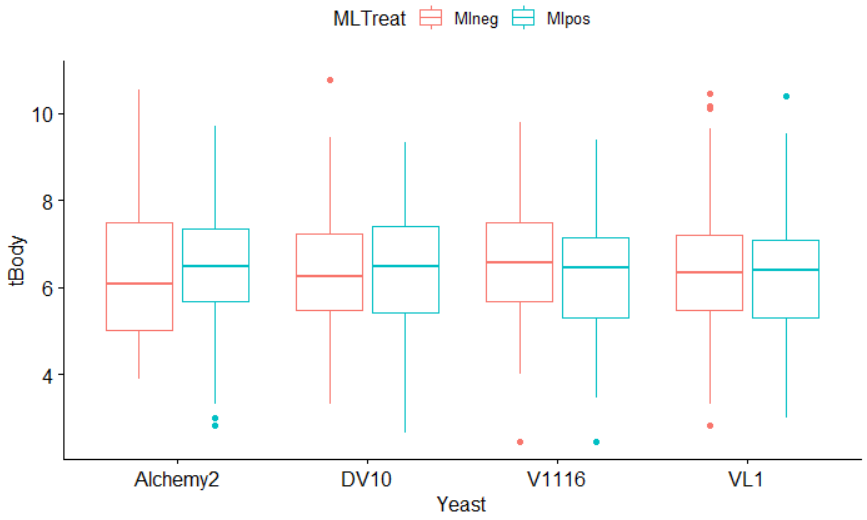

Fig 4. Boxplots for sensory perception of body showing the range and median values. No significant differences were detected between the wines.

The MLF treatment was significant for panelists' overall liking of a wine. The standard practice without the MLF was preferred ($p < 0.001$) independent of the yeast used. The overall preferred wine was V1116 (K1) without MLF, and the least preferred was made with the same yeast and MLF (Fig. 5).

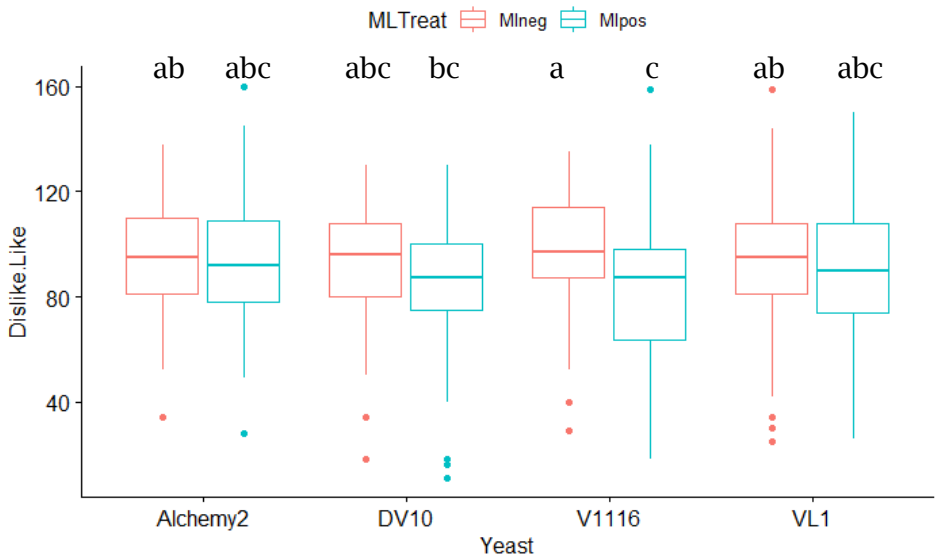

Fig 5. Boxplots for sensory perception of overall liking showing the range and median values. Lower values indicate a lower preference of the wine. Letters that are different indicate significantly different wines for overall liking.

Experiment 2: Skin contact treatments change perception of Itasca wines

In 2018, we conducted a second experiment to determine if extended skin contact improved the aromatic qualities of 'Itasca' wines. The grapes were picked on September 11, 2018. Initial juice chemistry was 3.35 pH and soluble solids content of 25.3˚ Brix.

Three treatments were applied to the fruit. 1) Control white wine making protocol (pressed with no skin contact); 2) skin contact at 45 ˚F for 24 hours; and 3) skin contact at 75 ˚ for 24 hours. After the treatment, the skin-contact berries were pressed and then fermented using our standard protocol and the yeast DV-10. After fermentation, wines were cold stabilized and bottled until evaluation.

Sensory evaluation was conducted at the Cold Climate Conference held at the Minnesota Landscape Arboretum in March, 2019 and at the Cold Climate Conference held in Traverse City, MI. Panelists were presented the three wines blind, although panelists received each wine in the same order. As stated previously, the panelists were industry professionals who had opted-in to the evaluation process and provided their responses on the same form as above. Only the results for the Minnesota evaluation with 41 panelists are included in this preliminary analysis.

Experiment 2 Results and Discussion

The skin contact treatments produced wines that were different for several attributes including sourness and overall liking of the wine without impacting body or aroma. As all wines were made to dryness, there was no expected difference in the perception of sweetness by the panelists. Our analysis indicated that sweetness was not different among the skin contact treatments. Similarly, there was no perceived difference in the total aromatic perception of the wine. There was a trend for a higher mean aromatic score for the control wine, but there was also a large standard deviation reflecting a range of responses from the panelists (Fig. 6). For the perception of the wine body, there was no statistical difference between the skin contact times and the control wine.

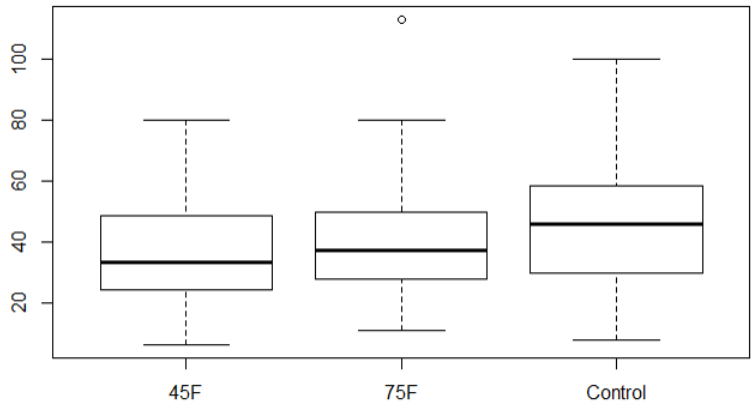

Fig. 6. Boxplot of perception of aromatic compounds in the three wine treatments. No significant difference was observed for this trait.

The panelists' perception of sourness was significantly different among the three wines ($p > 0.01$; Fig. 7). The 75 ˚F treatment was most sour, and the control treatment the least. There was no difference in perception of sourness for the 45 ˚F treatment.

The overall liking of the wines was significantly different by skin contact treatments, with the control being preferred over either of the extended skin contact treatments (Fig. 8). The 45 ˚F treatment was not significantly different than the control or the 75 ˚F, according to the ANOVA.

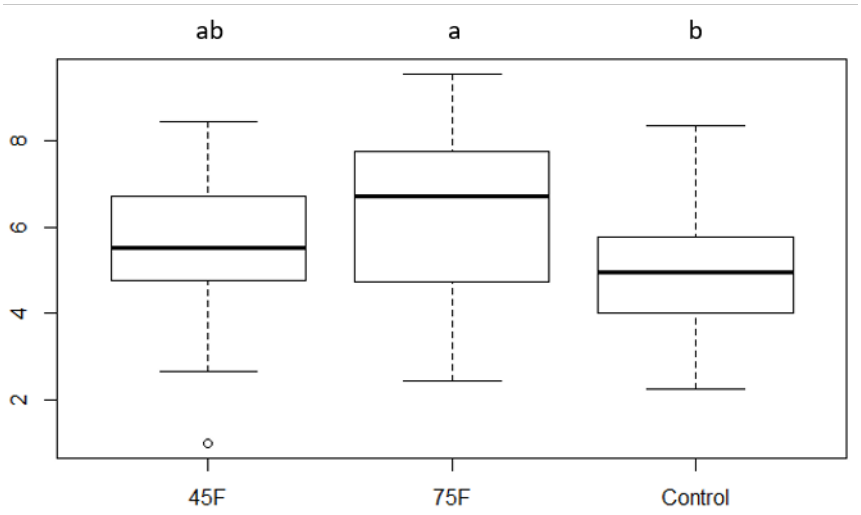

Fig. 7. Boxplots of sensory perception of sourness. Letters that are different indicate significantly different treatment effects for sensory perception of sourness.

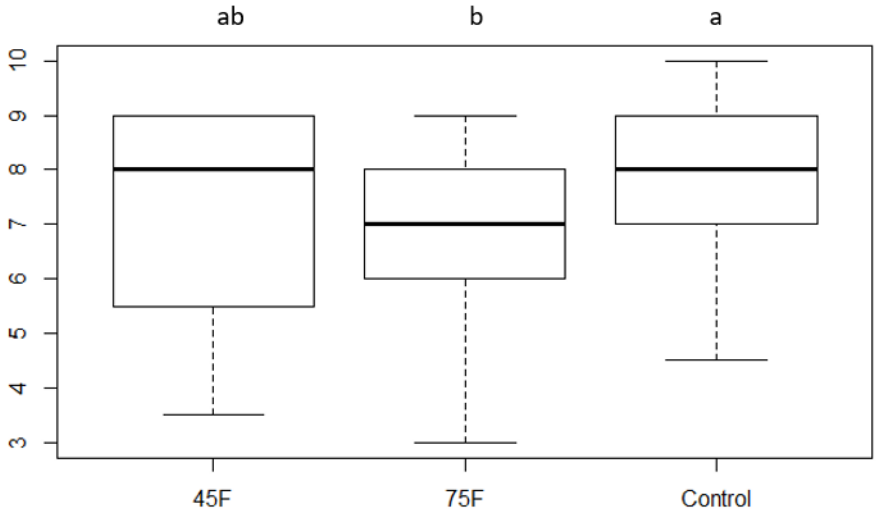

Fig. 8. Boxplot of overall liking of three wines by sensory panelists. Letters that are different indicate significantly different treatments for overall liking.

CONCLUSIONS

The preliminary findings presented in this report are based on small-scale, research winemaking protocols. The sensory data came from a pool of industry professionals who participated in the evaluations because of their interest in 'Itasca' wines, but are not trained sensory panelists. The results are intended to provide insight to winemakers who are producing wines with this new variety. Future research will continue to explore wine making techniques with Itasca, including evaluation of harvest parameters (date and soluble solids content). Two additional sensory evaluations have been conducted for Experiment 2, but the data has yet to be compiled and analyzed. Future research will also focus on developing descriptive analysis of this variety using trained sensory panels.

A summary of the results includes:

- **Malolactic fermentation is not preferred by sensory panelists**
- **Yeast V116 with no MLF was preferred, although all yeasts performed similarly for the overall liking**
- **No skin contact (the control method) was preferred by panelists and produced a wine that was perceived as less sour relative to extended skin contact**
- **If considering skin contact to increase tannins and/or raise pH, cold treatment at 45 °F is better**